

How Do Households Respond to Expected Inflation? An Investigation of Transmission Mechanisms

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Disclaimer: The views are those of the authors. No responsibility should be attributed to the Bank of Canada.

Inflation expectations are important:

- Affect prices firms set and wage negotiations
- Affect consumption, savings, and investment decisions of households

Contribution

We study **how** inflation expectations affect current household spending, and identify the **transmission mechanisms**

- In theory, various channels:
 - Example 1: Intertemporal substitution (Fisher and Euler equations)
! higher inflation expectations induce **higher** spending
 - Example 2: Rigid income does not catch up with inflation
! higher inflation expectations induce **lower** spending
- Existing empirical evidence on relationship between inflation expectations and spending
 - Mixed results in terms of sign and magnitude of the relationship
 - Does not distinguish different channels

Identifying Mechanisms

“But the inconsistent evidence across studies and across types of goods indicates that the **literature has not yet fully grasped the mechanisms** and models households use when relating inflation expectations to consumption decisions”

Weber, D’Acunto, Gorodnichenko and Coibion, JEP (2022)

“Households can interpret information treatments in many ways, leading to different channels through which expectations affect spending responses. One channel is the standard intertemporal Euler equation intuition... But treatments can work through other channels as well... [W]e **cannot distinguish between these different channels**. Our approach therefore estimates the combined effect of all the channels through which a change in inflation expectations may affect spending.”

Coibion, Georgarakos, Gorodnichenko and Rooij, AEJ Macro (2023)

- **Survey-based research on spending response to changes in inflation expectations**
 - Positive relationship: Duca-Radu et al. (2021), Vellekoop&Wiederholt(2019), Binder&Brunet (2022), D'Acunto et al. (2021), Burke&Ozdagli (2020), D'Acunto et al. (2023b), Coibion et al. (2022)
 - Insignificant or negative relationship: Bachmann et al. (2015a), Galashin et al. (2020), Coibion et al. (2022), Coibion et al. (2023), Andrade et al. (2023); Burke&Ozdagli (2020), Coibion et al. (2023)
 - **Contribution:** assessing mechanisms, long-term shock, and highlighting heterogeneity
- **Inflation narratives and subjective models of the economy:**
 - Consumers dislike inflation (Shiller 1996, Kamdar 2019, Hajdini et al. 2023)
 - Beliefs about inflation and unemployment are widely dispersed following hypothetical economic shocks (Andre et al. 2022)
 - **Contribution:** further understanding how consumers think about inflation and spending
- **Hypothetical scenarios:**
 - Andre et al. (2021), Armantier et al. (2022), Aidala et al. (2023), Fuster et al. (2020), Fuster and Zafar (2023)
 - **Contribution:** shock inflation expectations and assess effects on spending and mechanisms

Overview of Results

Following an increase in inflation expectations...

- **Most households (74%) keep current spending the same**
 - fixed budget
 - do not consider inflation expectations for current spending decisions
- **Minority of households (20%) reduce current spending**
 - saver's wealth effects
 - nominal income rigidity
 - Inflation hedging
- **Very small minority of households (6%) increase current spending**
 - intertemporal substitution
 - stockpiling

Survey Design

Four Treatments (2x2)

Current spending: spending in next 3 months

Short Term (S) vs Long Term (L)

- Inflation expectations " for _____ after next 3 months by 3pp
- Average annual inflation expectations " for _____ after next 3 months by 3pp

Durable (D) vs Nondurable (N)

- Assess effect on _____ goods consumption
- Assess effect on _____ goods and services consumption

Survey Modules

Pre-intervention Module

- Inflation expectations (next 3 months, 1 year, 10 years)
- 'Prior' household income growth, fed funds, financial situation predictability
- 'Prior' average monthly spending in next 3 months

Intervention Module

- Hypothetical " in inflation expectations (for 1 year or 10 years after next 3 months)

Post-intervention Module

- 'Posterior' household income growth, fed funds, financial situation predictability
- Change in economic outlook
- 'Posterior' average monthly spending in next 3 months
- Mechanism solicitation: (1) open text (2) yes/no to Proposed Mechanisms (3) weights to each chosen mechanism

Cognitive Reflection, Demographics and Financial Situation Module

Timing Visual (Short-Term Example)

- Use timelines and colors throughout survey for clarity
- Blue font refers to the next 3 months and red font indicates the 1-year period (or 10-year period), starting 3 months from now
- Elicit consumption over the next 3 months
- Intervention, priors, and posteriors are elicited over the 1- or 10-year horizon

Hypothetical Intervention to Inflation Expectations: Short-Term Wording

Hypothetical Intervention to Inflation Expectations: Short-Term Table

Note: (1) Expected inflation over next 3 months was fixed to the household's prior to avoid mechanical increases in spending. (2) Control question for updated expectations.

'Posterior' Current Consumption Plans

A series of questions to solicit change in consumption plans in the next three months:

- In response to the change in your expectations, would you change the amount or type of spending you plan to do over the next three months?
- If so, would you plan to change the dollar amount?
- If so, would you increase or decrease your consumption?

This results in four possibilities:

- Unchanged spending and goods
- Unchanged spending, but different goods
- Increase spending
- Decrease spending

If increase/decrease, also ask for spending

Mechanism Elicitation: Open Text Box (Approach 1/3)

Mechanism Elicitation: Yes/No to Proposed Mechanisms (Approach 2/3)

Shown mechanisms depend on:

- Qualitative change in consumption after intervention
- 'Posterior' beliefs about other economic variables

Mechanism Elicitation: Numerical Weights to Applicable Mechanisms (Approach 3/3)

Proposed Mechanisms for Unchanged Spending

- **Fixed Budget:** “I have a fixed budget plan and stick with it.”
- **Liquidity Constraints:** “I don’t have money and cannot borrow to increase my spending **over the next 3 months.**”
- **Not a Consideration:** “When I plan my spending decisions **over the next 3 months**, price changes **after the next 3 months** do not matter.”
- **Real Income Unchanged:** “My household income will keep up with price increases over this period. So, I will not change my spending decisions **over the next 3 months.**”
 - Only shown if beliefs about income rise by 3pp following intervention

Proposed Mechanisms for Unchanged Spending, Change in Goods

- **Fixed Budget:** “I have a fixed budget plan and stick with it.”
- **Liquidity Constraints:** “I don’t have money and cannot borrow to increase my spending over the next 3 months.”

Proposed Mechanisms for a Decrease in Spending 1/2

- **Saver's Wealth Effect:** "As prices will rise even more **after the next 3 months**, my existing savings over this period won't be worth as much. So, I will buy less durable goods **over the next 3 months**."
- **Inflation Hedge:** "As prices will rise even more **after the next 3 months**, I will move more money to assets not as affected by rising prices, such as real estate, and buy less durable goods **over the next 3 months**."
- **Rigid Income:** "As prices will rise even more **after the next 3 months**, my household income will not keep up with the price increases over this period. So, I will buy less durable goods **over the next 3 months**."
 - Only shown if beliefs about income do not rise by more than 3pp following intervention

Proposed Mechanisms for a Decrease in Spending 2/2

- **Variable Debt:** “As prices will rise even more **after the next 3 months**, the Fed (the central bank of the U.S.) will raise interest rates over this period. As a result, my household must pay more for our variable rate loans over this period. So, I will buy less durable goods **over the next 3 months** to save up for the higher future payments.”
 - Only shown if beliefs about the fed funds rate rose following intervention
- **Uncertainty:** “As prices will rise even more **after the next 3 months**, my household will face higher financial uncertainty over this period. So, I will buy less durable goods **over the next 3 months.**”
 - Only shown if beliefs about financial predictability fell following intervention

Proposed Mechanisms for an Increase in Spending 1/2

- **Intertemporal Substitution:** “As prices will rise even more **after the next 3 months**, the return on savings won’t be worth as much **after the next 3 months**, thus saving **over the next 3 months** becomes less attractive. So, I will buy more durable goods **over the next 3 months**.”
- **Stockpiling:** “As prices will rise even more **after the next 3 months**, I will buy more durable goods **over the next 3 months** before prices go up even more.”
- **Debtors Wealth Effect:** “As prices will rise even more **after the next 3 months**, given that my debt payments are fixed and my income will increase over this period, I will have more money left after paying my fixed debts. So, I will buy more durable goods **over the next 3 months**.”
 - Only shown if beliefs about income rose following intervention

Mechanisms for an Increase in Spending 2/2

- **Higher Real Income:** “As prices will rise even more **after the next 3 months**, my household income will rise faster than price increases over this period. So, I will buy more durable goods **over the next 3 months**.”
 - Only shown if beliefs about income rise by more than 3pp following intervention
- **Nominal Illusion:** “As prices will rise even more **after the next 3 months**, my household income will increase over this period. So, I will buy more durable goods **over the next 3 months**.”
 - Only shown if beliefs about income rise by 3pp or less following intervention

Cognitive Ability, Demographics, and Financial Situation

Cognitive Reflection Test

- Three questions that assess the tendency to override incorrect 'gut' responses
- Example: "A bat and a ball cost \$110 in total. The bat costs \$100 more than the ball. How much does the ball cost?"

Demographics

- Standard demographic questions
- Examples: age, education, gender, state of residence, political affiliation

Financial Situation

- Questions to assess the respondents' general economic and financial status
- Examples: employment status, income, savings, mortgage and auto loans

Survey Implementation, Data Trimming, Sample

Survey Implementation

- Conducted using Dynata in late February through March 2023
- Online consumer survey, age 18 and over
- Dynata provides a “representative” sample across age, gender, race, and census region
- We use demographic weighting to offset the fact the sample was older and more educated than the US
- Median completion time of 19 minutes
- After some cleaning, about 500 per treatment

Results

How Do Individuals Adjust Beliefs about Other Economic Variables?

Following an increase in inflation expectations,

- **Income**
majority do not expect income to keep up: 7% down, 47% same, 11% up by < 3pp
- **FFR**
majority (55%) expect FFR to stay the same;
a large proportion (39%) expect FFR to rise
- **Financial predictability**
majority (65%) expect financial predictability to stay the same;
24% expect increased uncertainty
- **Economic outlook**
41% expect a worsening economy;
35% expect no change

How Do Individuals Adjust Current Consumption?

Spending Response By Treatment

	(1)	(2)	(3)	(4)	(5)
	SD	SN	LD	LN	All
Extensive Margin (Percentage)					
No Change	70.3	57.4	57.2	66.5	63.2
Same Spending Different Bundle	7.2	11.9	14.7	9.8	10.8
Increase	5.7	5.6	6.7	5.8	6.0
Decrease	16.8	25.0	21.4	17.9	20.0
Intensive Margin (Dollar Spending)					
Prior Spending	533.10	888.46	538.75	831.72	687.39
Spending Change	11.59	-6.40	-44.27	-16.35	-13.86
Percentage Change	2.17%	-0.72%	-8.22%	-1.97%	-2.02%
N	504	504	497	498	2,003

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Mechanisms: No Change (Open Text)

- “I have a very good income and buy what I want when I want and inflation does not really effect those decisions” [Not a consideration]
- “Having a budget and sticking to that budget” [Fixed budget]

Mechanisms: No Change (Selecting Proposed Mechanisms)

Of the majority of households that decide not to change their consumption whatsoever, most say they have a **fixed budget plan or future inflation does not affect their current spending plans**

Households that Select Each Mechanism
As a Percent of 'No Change' Households

	(1)	(2)	(3)	(4)	(5)
	SD	SN	LD	LN	All
Fixed Budget	66.6	61.4	69.1	63.2	65.3
Not a Consideration	64.6	67.7	66.2	59.7	64.2
Liquidity Constraint	46.8	32.9	53.8	38.1	43.4
Real Income Unchanged	13.1	16.4	21.3	11.7	15.3
N	364	305	310	319	1,298

Mechanisms: Same Spending, Different Bundle (Open Text)

- "I would plan on spending the same amount, BUT would be much more choosey about what I spend on, buying generic vs brand products to offset." [Fixed budget]

Mechanisms: Same Spending, Different Bundle (Selecting Proposed Mechanisms)

Similarly to the households that would make no change, households who keep their spending the same while buying a different bundle often say this is due to **fixed budget plans**. Liquidity constraints are also common.

Households that Select Each Mechanism
As a Percent of 'Same Spending, Different Bundle' Households

	(1)	(2)	(3)	(4)	(5)
	SD	SN	LD	LN	All
Fixed Budget	73.2	82.7	65.9	75.5	73.4
Liquidity Constraint	48.8	46.6	53.1	59.9	52.4
N	31	52	52	65	200

Mechanisms: Decrease (Open Text)

- “Since the price of goods is increasing at a higher rate than I anticipated & my income will not keep pace with that increase in must decrease what I am spending.” [Rigid income]
- “i will have to buy less products. try to buy cheaper items. use more coupons and shop at dollar stores more.” [Other-General wealth effect]

Mechanisms: Decrease (Selecting Proposed Mechanisms)

Of the households that decrease their consumption plans, they most often say it is because of the **wealth effect, rigid incomes, and hedging motives**

Households that Select Each Mechanism
As a Percent of 'Decrease' Households

	(1)	(2)	(3)	(4)	(5)
	SD	SN	LD	LN	All
Savers Wealth Effect	79.2	92.4	79.3	97.5	87.0
Rigid Income	45.7	67.2	44.5	63.9	55.3
Variable Debt	22.8	30.1	35.1	49.5	34.3
Inflation Hedge	68.4	67.3	55.0	64.9	63.6
Uncertainty	26.6	36.6	37.0	52.9	38.1
N	81	117	105	91	394

Mechanisms: Increase (Open Text)

- “If prices will go up it makes more sense to buy long-lasting items sooner than later”
[Stockpiling]
- “ I am expecting gas prices to rise more than 3% and food prices to rise more than 3%, so i adjusted my proposed spending accordingly.” [Other-mechanical increase]

Mechanisms: Increase (Selecting Proposed Mechanisms)

Of the minority of households that increase spending, they most often select **intertemporal substitution or stockpiling**.

Households that Select Each Mechanism
As a Percent of 'Increase' Households

	(1)	(2)	(3)	(4)	(5)
	SD	SN	LD	LN	All
Intertemporal Substitution	71.2	41.5	76.4	56.1	62.9
Stockpiling	68.8	45.6	75.7	54.3	62.5
Debtors Wealth Effect	33.3	27.1	21.8	53.1	33.6
Flexible Income	5.2	9.4	20.8	48.6	21.4
Nominal Illusion	37.8	21.7	5.9	5.1	17.2
N	28	30	30	23	111

Predictors of a Decrease in Consumption

- Logit regressions of likelihood to **decrease** spending based on characteristics
 - Demographic variables: CRT, education, gender, race, political stance, age
 - Economic status variables: liquid savings, income
 - Posterior beliefs on other economic variables related to higher inflation expectations: FFR, financial predictability, income growth, economic outlook
- Variables associated with higher chance of reducing spending (and significantly so):
 - Female
 - Middle-aged
 - Low liquid savings
 - Middle income
 - Expect the economy to worsen
 - Expect their own financial uncertainty to rise
 - Expect their income to decrease

Treatment Effects

Posterior beliefs

- Long-term treatment ! more likely to expect
 - Income to keep up or outpace inflation (**)
 - FFR to rise (*)
 - Financial uncertainty to rise
 - Economy to worsen

Spending

- Extensive margin: similar across treatments
- Intensive margin:
 - Effects of durable and long-term are negative and individually insignificant
 - Combined effects ! consumption in LD significantly different from 0

Treatment Effects: Channels

Channel	Long-term treatment	Durable treatment
No Change and Same Spending, Different Bundle		
Liquidity Constraint		selected more (*)
Decrease		
Inflation Hedge		selected less
Savers Wealth Effect	selected more	
Variable Debt	selected more (**)	
Uncertainty	selected more	
Rigid Income	selected less	
Increase		
Intertemporal Substitution		selected more (*)
Stockpiling		selected more
Debtors Wealth Effect	selected more	
Flexible Income	selected more (**)	
Nominal Illusion	selected more (***)	

Robustness Treatments

- Larger increase in expected inflation for SD: 10 pp (versus 3 pp for main treatment)
- Modified timing of short-term hypothetical (SN and SD)
Inflation rate increases by 3pp in the upcoming year, average inflation remains same for the following years 2 through 10 (vs. average inflation remains same for the following 10 years)
- In both sets of robustness treatments
 - Extensive margins similar to main treatments
 - Intensive margin: reduction in spending on durables becomes statistically significant
- Reinforce the message that higher inflation expectations are unlikely to boost consumer spending

Conclusion

- Current spending in response to higher inflation expectations
 - **Majority report no change:** fixed budget, irrelevance of future inflation
 - **Minority report decrease:** income rigidity, erosion of savings, inflation hedging
 - **Small minority report increase:** stockpiling; intertemporal substitution
- Changes in beliefs about other economic variables significantly affect spending. More likely to decrease spending if expecting:
 - Economy to worsen
 - Financial predictability to worsen
 - Income to decrease
- Policy implications
 - " inflation expectations as a policy tool to stimulate economy may be ineffective
 - Subjective models about macroeconomy are heterogeneous and affect decisions

